and was abandoned by the crew. The *Nelson* left Astoria on November 3, and southeast storm warnings were displayed at all stations at the mouth of the Columbia River when the vessel put to sea. The captain reports encountering a severe storm on the night of November 4, which increased in energy and finally resulted in wrecking his vessel.

On November 9, the schooner *C. A. Thayer* went ashore at the entrance to Grays Harbor during the gale of that date. A gale of 90 miles an hour from the southeast occurred at North Head on the morning of the 9th. The masters of incoming vessels all report having experienced gales of hurricane force near the American coast, which did much damage in carrying away masts, rigging, hatches, lifeboats, etc. With the exception of the *Charles Nelson*, however, the disasters caused by the storms were almost exclusively confined to inward-bound shipping.

The forecasts for this district were made by District Forecaster Edward A. Beals from the 1st to the 5th, inclusive, and by Observer A. B. Wollaber during the remaining days of the month.—*A. B. Wollaber, Acting District Forecaster.*

RIVERS AND FLOODS.

No floods of consequence were reported during the month, and there was but a single stage above a danger line recorded, namely at Red Bluff, Cal., where a stage of 24.5 feet, 1.5 feet above the danger line was reached as a result of exceptionally heavy rains that lasted from the 19th to the 22d, inclusive, and amounted to about 5.50 inches. Warnings were issued on the 20th, advising the removal of live stock and care of the levees.

The stages of the Mississippi River, like those of the corresponding period of the preceding year, were above the average for the season below the mouth of the Missouri River, and they were also higher above the mouth of the Ohio River than during October. The Missouri River changed but little, while the Ohio was higher. The Tennessee was too low for navigation, except for the week from the 18th to the 24th, inclusive, and at the close of the month 85,000 cross-ties were lying on the bank of the river at Florence, Ala., awaiting sufficient water for shipment.

Floating ice was observed in the Mississippi River at St. Paul, Minn., on the 18th, reaching Hannibal, Mo., on the 25th, and continuing until the 30th. The Missouri River at Bismarck, N. Dak., froze over on the 17th. Floating ice had previously been seen as early as the 13th. The ice reached Pierre, S. D., on the 15th, and closed the river on the 18th. Running ice was observed at Sioux City, Iowa, from the 17th to the 19th, inclusive, and the river gage was frozen in on the former date.

The James River, Northwest, also froze over on the 17th, while the Red River of the North, at Moorhead, Minn., closed on the morning of the 27th. The Penobscot River, at Mattawamkeag, Me., closed on the 26th; the Merrimac, at Concord and Manchester, N. H., on the same date. The ice went out two days later, however, at the latter place. The Connecticut River at Wells River, Vt., froze over on the 21st, and floating ice was quite plentiful at all points below, forming a small gorge above the bridge at Hartford, Conn., on the 28th.

The departure on the 30th of the steamboat *Dean Richmond*, from Albany, N. Y., marked the close of through navigation for the season on the Hudson River.

At the end of November, 1902, very little ice had been observed in the various rivers.

The highest and lowest water, mean stage, and monthly range at 183 river stations are given in Table VII. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, District Forecaster.*

AREAS OF HIGH AND LOW PRESSURE.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocity.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	2, p. m..	54	114	9, p. m..	39	75	3,050	7.0	436	18.1
II	8, a. m..	43	123	10, a. m..	35	85	2,150	2.0	1,075	44.8
III	12, p. m..	51	114	15, p. m..	35	76	2,450	3.0	816	34.0
IV	16, a. m..	54	114	22, a. m..	46	60	3,775	6.0	629	26.2
V	25, a. m..	50	97	28, a. m..	28	83	1,900	3.0	633	26.4
VI	28, a. m..	51	114	*1. a. m..	37	81	2,575	3.0	858	35.8
Sums							15,900	24.0	4,447	185.3
Mean of 6 paths							2,650		741	30.9
Mean of 24.0 days									662	27.6
Low areas.										
I	4, a. m..	48	89	6, a. m..	46	60	1,500	2.0	750	31.2
II	5. p. m..	41	70	8, a. m..	46	60	725	2.5	290	12.1
III	6, p. m..	54	114	10, p. m..	48	68	2,800	4.0	700	29.2
IV	9, p. m..	54 43	114 109	11, p. m..	48	86	1,800 1,700	2.0	900 850	37.5 35.4
V	11, a. m..	47	123	13, a. m..	48 35	86 97	2,275 1,900	2.0	1,136 950	47.3 39.6
VI	14, a. m..	47	123	17. p. m..	48	68	3,100	3.5	886	36.9
VII	21, a. m..	48	125	25, a. m..	50	64	3,050	4.0	762	31.8
VIII	23, p. m..	37	117	25, p. m..	30	82	2,250	2.0	1,125	46.9
IX	27, a. m..	54	114	30, a. m..	42 47	80 65	2,225 3,375	3.0	742 1,125	30.9 46.9
Sums							26,700	25.0	10,216	425.7
Mean of 12 paths							2,225		851	35.5
Mean of 25.0 days									1,068	44.5

* December.

For graphic presentation of the movements of these highs and lows see Charts I and II.—*George E. Hunt, Chief Clerk, Forecast Division.*

CLIMATE AND CROP SERVICE.

By Mr. JAMES BERRY, Chief of Climate and Crop Service Divison.

The following summaries relating to the general weather and crop conditions during November are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau; they are based upon voluntary reports from meteorological observers and crop correspondents, of whom there are about 3000 and 14,000, respectively:

Alabama.—The first half of the month was warm and favorable, but the latter half was much colder than the average. The rainfall was deficient, particularly in the central counties. A severe cold wave on 19th damaged recently sprouted wheat and oats and fall gardens, and killed some very late cotton on lowlands; cotton mostly marketed. About an average acreage of wheat and oats indicated, early sown doing well.—*F. P. Chaffee.*

Arizona.—Rainless weather prevailed throughout the entire month, making, with the rainless weather of the greater portion of October, an exceptionally long dry spell. Temperatures averaged above normal. There was an abundance of feed on ranges, due to the good rains of the latter part of September, and this was well cured as hay by the dry weather. Stock was in excellent condition, but the supply of water was diminishing, causing fear of suffering unless rain came soon.—*M. E. Blystone.*

Arkansas.—The unusually cool and dry weather was favorable for gathering outstanding crops, but was too dry for plowing, seeding, and germination. Cotton picking well advanced, probably 80 per cent completed; the yield was light. Corn all gathered; yield average. Irish and sweet potatoes made good crops, and harvesting was nearly completed. Less than usual acreage sown to small grain. Pastures dried up and stock water was scarce, but an abundance of winter feed was secured and stock was generally thrifty.—*Edward B. Richards.*

California.—Weather conditions were nearly normal during the month,